Final Report

Elucidating the Structure of *Geobacter sulfurreducens* Conductive Pili and the Features Conferring Metallic-Like Conductivity

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SCIENTIFIC AND TECHNICAL OBJECTIVES

Electrically conductive pili are important in bioelectrochemical technologies and show promise as a sustainable electronic material for the development of nanowire sensors and other electronic devices. The objective of the research was to elucidate the structure of the electrically conductive *G. sulfurreducens* pilus and to define the fundamental principles for biological metallic-like conductivity that will guide fabrication of synthetic protein nanowires with diverse functionalities.

APPROACH

The research approach was to first develop a model for the structure of the native, wild-type electrically conductive pili of *Geobacter sulfurreducens* (b) (4)

CONCISE DESCRIPTION OF ACCOMPLISHMENTS

(b) (4)

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EXPANDED DESCRIPTION OF RESULTS

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IMPACT/APPLICATIONS/TRANSISTIONS

These results are significant because they demonstrate the feasibility developing structure-based models to describe the conductivity mechanisms for natural conductive protein nanowires and to guide the design of synthetic protein nanowires. (b) (4)

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REFERRED PUBLICATIONS

Walker, D. J. F., R. Y. Adhikari, D. E. Holmes, J. E. Ward, T. L. Woodard, K. P. Nevin, and D. R. Lovley. 2017. Electrically conductive pili from genes of phylogenetically diverse microorganisms. ISME J. 11:doi:10.1038/ismej.2017.141.

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